BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 19

2004 ANNUAL UPDATE

Shellfish Sanitation Program

Water Monitoring, Assessment and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

July 2004

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South Carolina Department of Health and Environmental Control

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2004 ANNUAL UPDATE

[Data Thru December 2003]

Shellfish Management Area 19
Shellfish Sanitation Program

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Data Inclusive Dates:
01/01/01 thru 12/31/03

Classification Change:
__X__ Yes ___ No

Shoreline Survey Completed: __Yes__

Prior Report & Date: Annual -2003

(I)ncreased/(D)ecreased/(N)one:
__I__ Approved
__N__ Conditionally Approved
__D__ Restricted
__N__ Prohibited

SUMMARY

The majority of monitoring stations in Shellfish Management Area 19 indicate a slight decline in water quality (increased values for geometric mean and/or estimated 90th percentile MPN values) subsequent to the previous sanitary survey. The bacteriological water quality data reflects the return to normal rainfall amounts in 2002 and 2003 following drought conditions the region experienced during the period 1999 to 2001.

Water quality in the New River (Station 21), however, has met the statistical criteria for an Approved classification for the last three annual review periods. The estimated 90th percentile MPN value is currently 11; therefore, the harvest classification of the New River, from Station 21 to the confluence with the Cooper River at Station 02A, will be upgraded to an Approved classification.

Monitoring at Station 26 (May River, Southeast of Heyward Cove) was initiated in January 2004. This station was created to assess the impact of stormwater runoff from Heyward Cove on water quality in the adjacent portion of the May River.

Station 23, New River at Walls Cut, will be deactivated. The station is in such close proximity to Station 06 that the sample results are essentially duplicates. Station 27 will be created at the confluence of Wright River with the Atlantic Ocean.

The Town of Bluffton has annexed over 31,000 acres of undeveloped land, primarily in four tracts: Palmetto Bluff, Buckwalter, Shults, and the Jones Estate. These are planned unit developments with homes, businesses, and parkland in their future. A total of 18,870 residential units are planned with a development timeframe of 20 to 30 years. Five thousand acres on Palmetto Bluff will remain as managed forest. In these four tracts, approximately 672 acres will be used for parks, open-space preserve, and public school and government facilities.

The United States Geological Survey (USGS) and South Carolina Department of Natural Resources (SCDNR) conducted a baseline assessment of environmental and ecological conditions in

the May River. The focus of the study was an evaluation of the water quality of the May River through water quality monitoring and continuous monitoring of the main stem and selected tributary creeks. SCDNR conducted biological and sediment evaluations. The overall objective was to provide the planners and resource managers of the Town of Bluffton with a substantial amount of baseline data about the current water quality conditions in the May River and its tributaries prior to planned development activities. The report was released in April 2004 (See Water Quality Studies).

INTRODUCTION

Purpose and Scope

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47 which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The National Shellfish Sanitation Program (NSSP) Guide For The Control Of Molluscan Shellfish is used by the United States Food and Drug Administration (USFDA) to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved - Growing areas shall be classified Approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations which would render shellfish unsafe for human consumption. The Approved area classification shall be designated based upon a sanitary survey which includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, and not more than ten percent of the samples shall exceed a fecal coliform MPN of forty-three per one hundred milliliters (per

five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, and the estimated ninetieth percentile shall not exceed an MPN of forty three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP Guidelines.

Conditionally Approved - Growing areas may be classified Conditionally Approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as Conditionally Approved. Where appropriate, the management plan for each Conditionally Approved area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems, evaluation of each source of pollution, and means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate.

Restricted - Growing areas shall be classified Restricted when sanitary survey data show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree which may cause the water quality to fluctuate unpredictably or at such a frequency that a Conditionally Approved classification is not feasible. Shellfish may be harvested from areas classified as Restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision. For Restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Conditionally Restricted - Growing areas may be classified Conditionally Restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as Conditionally Restricted. Where appropriate, the management plan for each Conditionally Restricted area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems and an evaluation of each source of pollution) and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these

management plans where appropriate. Shellfish may be harvested from areas classified as Conditionally Restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For Conditionally Restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of Conditionally Restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Prohibited - Growing areas are classified Prohibited if there is no current sanitary survey or if the sanitary survey or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or indicate that such substances could potentially reach quantities which could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

Shellfish Management Area 19 consists of 28,146 acres of shellfish growing area habitat in Beaufort and Jasper Counties. It is comprised of the May, Cooper, New and Wright Rivers and their tributaries including Bull Creek and Ramshorn Creek.

The area's northern boundary is at Highway 170 near the intersection of Highway 46 and Highway 170. It continues along Highway 278 to the western shore of Mackays Creek. The eastern boundary is defined by the shoreline of Calibogue Sound to the confluence of the Savannah River. The Savannah River defines the southern boundary. The western boundary was modified for the prior survey and now is in the vicinity of Station 20 in the Wright River and Station 21 in the New River, ending at the intersection of Highways 46 and 170.

The Atlantic Intracoastal Waterway (AIWW) runs through Area 19 between the Cooper River and Savannah River.

Residential development in Area 19 is centered around Highway 278 and the Bluffton area and on Daufuskie Island, which is accessible only by boat. The majority of the shellfish resources and harvesting activity is located around the May River area. The Bluffton Oyster Company operates an oyster shucking plant adjacent to the May River.

The harvesting classification of Area 19 prior to this survey was as follows:

Prohibited: (Administrative closure)

1) Cooper River Marina, closure zone of 1000 feet around marina;
2) Savannah River, all waters in South Carolina portion,

3) Field's Cut, from its confluence with the Savannah River to its confluence with the Wright River at Station 22.

Restricted/No depuration: None

Restricted:

1) New River, from the Area 19 boundary to Station 02A, at the confluence of the Cooper River.

Conditionally Approved: None

Approved: The remaining waters of Area 19.

The shellfish industry in South Carolina is based mainly on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams (*Mercenaria mercenaria*). Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include state shellfish grounds, culture permits, mariculture permits, and Kings Grant areas.

There are five shellfish culture permit areas in Area 19. Culture Permit C-004 is leased to Bluffton Oyster Company, C-002 and C-009 to Carl Dipace, C-032 to Roy May, and C-033 to Neal Cooksey. The general public is allowed to harvest on three state shellfish grounds in Area 19. State Shellfish Ground 003 is located on Turtle Island, S-005 is located on Haig Point, and S-007 is in Bull Creek. Recreational harvesting is allowed for clams and oysters in all areas, and commercial harvesting by licensed individuals is allowed, subject to seasons established by SCDNR. Recreational harvesting only is allowed on the Bull Creek/May River Public Shellfish Ground (R-008).

Shellfish harvesting season in South Carolina extends from September 16 through May 15, although actual dates may vary. SCDNR has the authority to alter the shellfish harvest season for management purposes. The South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that all shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

SURVEY PROCEDURES

Shoreline surveys of Area 19 were conducted by the Low Country District Shellfish Sanitation staff**,** by watercraft, vehicle, and on foot, during the survey period and are ongoing.

POINT SOURCE POLLUTION

Major sources of actual or potential pollution (See Figure 4).

PERMITTED FACILITIES	PERMIT # / TYPE / DISCHARGE
BJW&SA Rose Hill Plantation WWTP	ND0061000/ 0.50 MGD/spray irrigation
BJW&SA Bluffton WWTP	ND0069191/ 0.435 MGD/spray irrigation
BJW&SA Palmetto Bluff WWTF	ND0082147/ 0.20 MGD/ spray irrigation
Brighton Beach Mobile Home Park WWTP	Eliminated –tied into BJW&SA Bluffton WWTP
Haig Point/Melrose WWTP	ND0062286/ 0.64MGD/ spray irrigation
Daufuskie Island WWTP	ND0068179/ 0.08 MGD/ spray irrigation
Freeport Marina	Marina/ no pumpout facilities
Melrose Landing	Marina/ no pumpout facilities

A. Municipal and Community Waste Treatment Facilities - There are no direct discharges of wastewater into the waters of Area 19. Treated effluent from the area's wastewater treatment plants is typically used for spray irrigation on golf courses. The permit for a new wastewater treatment facility at Palmetto Bluff was issued on May 28, 2002. Treated effluent will be discharged to a dedicated 86-acre golf course and a 167-acre spray field (as a backup system). Because the disposal sites are adjacent to shellfish waters, the permit's fecal coliform bacteria limits are a monthly average of 14/100 ml and a daily maximum of 43/100 ml. Phase III is the expansion of the WWTF and land application system for an ultimate design of 0.5 MGD. Phase III also includes the submittal of design considerations for the conversion of the proposed treatment facility to holding basins and the diversion of the development's wastewater to the BJW&SA Cherry Point /Okatie Treatment Facility after year 10.

B. Industrial Wastes - There are no permitted industrial discharges in Area 19.

C. Marinas - S.C. Regulation 61-47, Shellfish defines Marina as "any water area with a structure (docks, basin, floating docks, etc.) which is: 1) used for docking or otherwise mooring vessels; and, 2) constructed to provide temporary or permanent docking space for more than ten boats, or has more than 200 linear feet of docking space." There are two marina locations in Area 19. Melrose Landing and Freeport Marina located in the Cooper river at Daufuskie Island do not have marine sewage pumpout facilities. An approximately 1100 meter by 470 meter administratively Prohibited closure zone has been established on the Cooper River to encompass these facilities.

D. **Radionuclides** - The Savannah River is a possible source of Radionuclides in Area 19. A fish consumption advisory is in effect for Strontium-90 and Cesium-137 in the Savannah River between Beech Island in Aiken County to the Webb Wildlife Center in Hampton County. Radionuclide monitoring of oyster tissue conducted in 1998 and 1999 indicated Cesium and Strontium at below detection levels. No other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

A. **Stormwater** - There is a significant amount of residential and business development in progress along Highway 278 and in the Bluffton area. A new road connecting Highway 278 and Highway 46 has been built. Two schools have been built adjacent to Highway 46. Land disturbance activities associated with these developments are subject to current stormwater regulations and, with few exceptions, all are on sewer. Palmetto Bluff is an approximately 19,000-acre tract of land bordered by the May, New and Cooper Rivers. Construction has recently begun.

Monthly monitoring at special site NC-1, in Heyward Cove, began on 03/15/99. Non-systematic random monitoring at this site is not for classification purposes (hence the designation NC), but is used to assess the impact of stormwater drainage on shellfish water quality in the May River. Heyward Cove receives stormwater drainage from a system of ditches that drain a large portion of the rapidly developing Bluffton area between Highway 278 and the May River. During the period between 03/15/99 and 05/02/00, four sample results had fecal coliform bacteria MPN concentrations of >2400, the highest value that can be obtained without prior dilution of the samples. Three of the four were preceded by rainfall amounts ranging from 0.46 to 1.22 inches in the period between 0 to 72 hours prior to sample collection. Bacteria entering the May River from Heyward Cove are diluted by the larger volume of water and are reduced in number as a result of exposure to high salinity, and are then dispersed by current. No adverse impact has been observed at adjacent stations 16 and 18. Monitoring of Heyward Cove will continue, however, as the volume of stormwater discharged through Heyward Cove will increase as the area develops and because there exists the potential for illness related to the source of fecal coliforms. Monitoring at a new station, 26, in the May River, Southeast of Heyward Cove, started in January, 2004. This station was created to assess the impact of stormwater runoff from Heyward Cove on water quality in the adjacent portion of the May River.

Stormwater runoff impacts water quality by transporting fecal coliform bacteria (and other pollutants) from land to the shellfish growing area. Stormwater from roads, residences, and agricultural land is directed to the lowest point of elevation that is typically the nearest creek or marsh. In addition, there are freshwater wetland areas, ditches, and impoundments that drain into tidal creeks.

Most land disturbing activities in South Carolina must comply with the Stormwater Management and Sediment Reduction Act of 1991. The final regulations, effective on June 26, 1992, establish the procedures and minimum standards for a statewide stormwater management program. For activities in the eight coastal counties, additional water quality requirements are imposed. For all projects, regardless of size, which are located within one-half mile of a receiving water body in the coastal zone, the criteria for permanent water quality ponds having a permanent pool is that they are designed to store the first inch of runoff from the entire site over a 24-hour period or storage of the first one inch of runoff from the built-upon portion of the property, whichever is greater. Storage may be accomplished through retention, detention, or infiltration systems, as appropriate for the specific site. In addition, for those projects that are located within 1000 feet of shellfish beds, the first one and one half inches of runoff from the built-upon portion of the property must be retained on site. Since 1992, these regulations have been applied to the development of residential subdivisions, golf courses, and business areas.

B. **Agricultural Waste** - Small numbers of cattle and horses are located in area 19, but no adverse impact to water quality has been observed.

C. **Individual Sewage Treatment and Disposal (ISTD) Systems** - The majority of homes in Area 19 utilize central sewage collection systems for wastewater disposal. Older homes adjacent to the May River typically utilize ISTDs.

D. **Wildlife and Domestic Animals** - This area supports populations of white-tailed deer, raccoons, wading birds, migratory waterfowl, and other wildlife, which may contribute to fecal coliform levels in some areas. Domestic animals present in the area include dogs, cats, horses, and goats.

E. **Boat Traffic** - Calibogue Sound provides access to the Atlantic Ocean for commercial and recreational vessels. The Atlantic Intracoastal Waterway (AIWW) runs between the Cooper River and the Savannah River. Tugs and barges, commercial and recreational vessels utilize this North/South route.

F. **Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval.

G. **Marine Biotoxins** - There have been no documented occurrences of toxic algae affecting water quality in Area 19. The Department participates in a State Task Force on Toxic Algae and maintains a toxic algae emergency response team.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 19 is part of the Savannah River estuary, a coastal plain system which includes the New, Wright, and Savannah Rivers and several distributaries of Savannah River (e.g. Front, Back, and Middle Rivers and the South Channel). It is separated from the Broad River estuary by a tidal node in Calibogue Sound, just northeast of May River. The average depth of the estuary is approximately 5 meters at mid- tide level. Navigational channels downstream from Highway 17 in the lower Savannah and Front Rivers range from 9m to 12m in depth and facilitate the intrusion of saltwater into the estuary. The conversion of thousands of acres of saltwater wetlands into diked disposal areas on the South Carolina side could also have altered flow patterns and salinity regimes.

Most tidal exchange occurs through the entrance to Savannah River, primarily through the North Channel; however, limited exchange occurs with the Broad River estuary through Calibogue Sound. The salinity structure is primarily determined by controlled releases of freshwater from impoundments on Savannah River and its tributaries. (NOAA, 1994).

Tides - Tides in Area 19 are semidiurnal, consisting of two low and high tides each lunar day. Mean tidal range is 7.0 feet during normal tides and 8.9 feet above mean low water during spring tides. The greatest tidal ranges of the year typically occur around full moon during the months of September through December. There is considerable variation in the normal tide range due to the prevailing strength and direction of winds.

Rainfall - Rainfall data used in this survey is collected at a weather station located at the BJW&SA Southside WWTP (station 380559- Beaufort 7 SW). Rainfall is recorded at 7 AM (for the period of 7 AM of the previous day to 7AM of the date shown in the table). As most shellfish samples are collected after 7:00 AM, the rainfall for the sample date + 24 hours has been added to the rainfall summary table. Rainfall for the sample date + 24 hours may correlate better and help to explain elevated fecal coliform concentrations in sample results, particularly if there was zero rainfall on the date of or prior to monitoring.

Annual rainfall recorded at the Beaufort 7SW weather station during 2000 and 2001 (see Chart Beaufort Annual Rainfall) was significantly below the annual norm as averaged over a 30-year period. Below normal rainfall continued through May 2002 and by August 2002 the drought status of all 46 counties in the state, including Beaufort and Colleton, had been upgraded to extreme. Above normal rainfall beginning in late August, however, led the S.C. Drought Response Committee to downgrade the drought status statewide and remove the drought declaration for Beaufort, Charleston, and Colleton counties on November 21, 2002.

Annual rainfall averages approximately 51.15", with August being the wettest month. Charts showing yearly rainfall amounts for the years 1997 through 2002 are attached. Approximately 40% of the annual rainfall falls in the three-month period from June to August. Weather patterns during this time

period are often characterized by thunderstorms and shower activity of a short duration. In addition, these three months also have the highest numbers of days with rainfall greater than 1". The months of December through March historically have the greatest number of days with rainfall exceeding 0.10" and 0.50". Rainfall events during these months are typically of a longer duration.

Winds - The prevailing wind direction between February and September ranges between South and South Southwest (180 to 200 degrees) and between October and January is North Northeast (20 degrees). The annual mean wind speed is 8.5 MPH, with August having the lowest (7.3 MPH) and March the highest (10.0 MPH) mean wind speed.

River discharges - The May River receives no freshwater from river discharges, but some from freshwater wetlands. The New River receives freshwater input from the Great Swamp. The Wright River receives most of its freshwater input from Savannah River. Fields Cut connects the AIWW and Wright River to the Savannah River. Highest river discharge usually occurs in late winter and early spring due to heavy precipitation in the Blue Ridge and piedmont areas, with the lowest discharge occurring late summer and fall. The salinity structure of the Savannah River estuary is primarily determined by controlled releases of freshwater from impoundments on Savannah River and its tributaries.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 19 in lieu of monitoring under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Monitoring dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays, and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated data analysis procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station yet provides a six-sample “cushion” (above the NSSP required 30 minimum) for broken samples, lab error, breakdowns, etc. This also allows each annual report to meet the NSSP Triennial Review monitoring criteria.

Seven hundred ninety (790) surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses at 22 active water quality monitoring stations in Area 19 during the period 01/01/01 through 12/31/03. Monitoring at Station 26, in the May River, Southeast of Heyward Cove, started in January 2004. Samples were collected in 120 ml amber glass bottles, immediately placed on

ice and transported by bus to the South Carolina Department of Health and Environmental Control's Trident District Environmental Quality Control laboratory at North Charleston, South Carolina or the Low Country District Environmental Quality Control laboratory at Beaufort, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. Upon receipt at the laboratory, sample sets that exceeded a 30-hour holding time or contained a temperature control >10 degrees C. were discarded.

Samples collected after September 1, 1986 have been analyzed using the five-tube/three dilution modified A-1 method described by Nuefeld (1985). Surface water temperatures were measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using automatic temperature compensated refractometers. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of monitoring. Tidal stages were determined Nautical Software's Tides and Currents, Version 2 (1996).

The final report on "*A Baseline Assessment of Environmental and Biological Conditions in the May River, Beaufort County, South Carolina*" was released in April 2004. The report's conclusions state that: "A triad assessment of water quality, sediment quality, and biotic condition was used in this study to evaluate overall condition in each habitat (i.e., headwater creeks, large tidal creeks, and open water sites) using a weight of evidence. Based on current State criteria and regional guidelines, the results indicated that most of the May River estuarine habitats are in good condition, although several headwater creeks showed some signs of stress. Based on an evaluation of land use patterns, the stressful conditions observed in these creeks were probably not related to anthropogenic inputs, and are likely natural phenomena of this system.

Fecal coliform bacteria concentrations, while relatively high in all headwater tidal creeks were generally not indicative of human sources (relatively 'high' concentrations of fecal coliforms have been observed in headwater creeks during previous studies.) These elevated bacterial counts in the unpopulated Palmetto Bluff Creek and the sparsely populated Stony and Rose Dhu creek watersheds indicate a natural source of fecal coliform bacteria that is probably attributable to wildlife.

Wastewater indicator compounds were only sampled at Heyward Cove and Palmetto Bluff creeks. Several wastewater indicator compounds were detected in Heyward Cove Creek during the winter that may be indicative of human sources of contamination from leaking sewer or septic systems. Heyward Cove Creek drains a watershed with the highest human population density of any creek studied in the May River."

MONITORING RESULTS

All stations (01, 02, 02A, 03, 04, 05. 06, 07, 08, 09, 11, 12, 16, 17A, 18, 19, 20, 21, 22, 23, 24, and 25) meet the statistical criteria for Approved classification.

CONCLUSIONS

Based on review of fecal coliform bacteriological data and the pollution source survey, Area 19 is minimally affected by two sources of actual or potential pollution.

NONPOINT SOURCE RUNOFF

Stormwater runoff appears to be the primary source of the minimal fecal coliform bacteria concentrations in Area 19. Possible sources of fecal coliform bacteria contamination include pets, wildlife, domestic animals such as horses and cows, failing septic systems, and drainage from roads and freshwater wetlands.

Freshwater Inflow - Isolated heavy rainfall events can also result in low salinities and elevated fecal coliform concentrations. Increased discharge from upstream swamps and impoundments, wildlife, increase in soil bacteria, and failing septic systems are possible causes of elevated fecal coliform concentrations at stations in the New and Wright Rivers.

RECOMMENDATIONS

Water quality at Station 21, in the New River, has met the statistical criteria for an Approved classification for the last three Annual Updates. The 90^{th} percentile MPN value is currently 11. Therefore, it is recommended that the harvest classification of the New River, from Station 21 to the confluence with the Cooper River, be upgraded to Approved.

It is recommended that Station 23, New River at Walls Cut, be deactivated, as the station is in such close proximity to Station 06 that the sample results are essentially duplicates. It is further recommended that a new station (27), be created at the confluence of Wright River with the Atlantic Ocean.

Site-specific closure zone surveys should be conducted for the Freeport Marina and Melrose Landing Marina facilities, as well as several community docks located on the Cooper River.

The shoreline survey and bacteriological data review of shellfish Management Area 19 indicate that changes in classification boundary descriptions are necessary. The following growing waters classification of Area 19 is recommended (see Figure 3):

Prohibited: (Administrative closure)

1) Freeport Marina (Cooper river), closure zone of 1000 feet around marina;
2) Melrose Landing (Cooper River, closure zone of 1000 feet around marina;
3) Savannah River, all waters in South Carolina portion;
4) Field's Cut, from its confluence with the Savannah River to its confluence with the Wright River at Station 22.

Restricted/No depuration: None

Restricted: None

Conditionally Approved: None

Approved: The remaining waters of Area 19.

Station Addition/Deactivation/Modification

Addition: Station 19-27; Wright River, at confluence with Atlantic Ocean. Lat/Lon 32-03-00 / 080-54-30. Station 19-27 will assess water quality adjacent to S-003 (Turtle Island) and C-002. Monitoring will commence in January 2004.

Deactivation: Station 19-23; New River at Walls Cut. Lat/Lon 32-04-57, 80-54-54. Station's close proximity to Station 19-06 returns duplicative results.

Analysis of monitoring data for Area 19 demonstrates a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of Area 19 will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured at the Beaufort-7-SW Weather Station. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). PMP estimates for the coastal United States has been published in a series of hydro-meteorological reports (HMRs) by the National Weather Service (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52, and 53 (*National Research Council, 1985*).

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Environmental and Biological Conditions in the May River, Beaufort County, South Carolina" South Carolina Department of Natural Resources. Charleston, S.C.

TABLE #1
Shellfish Management Area 19
Water Quality Monitoring Stations Description

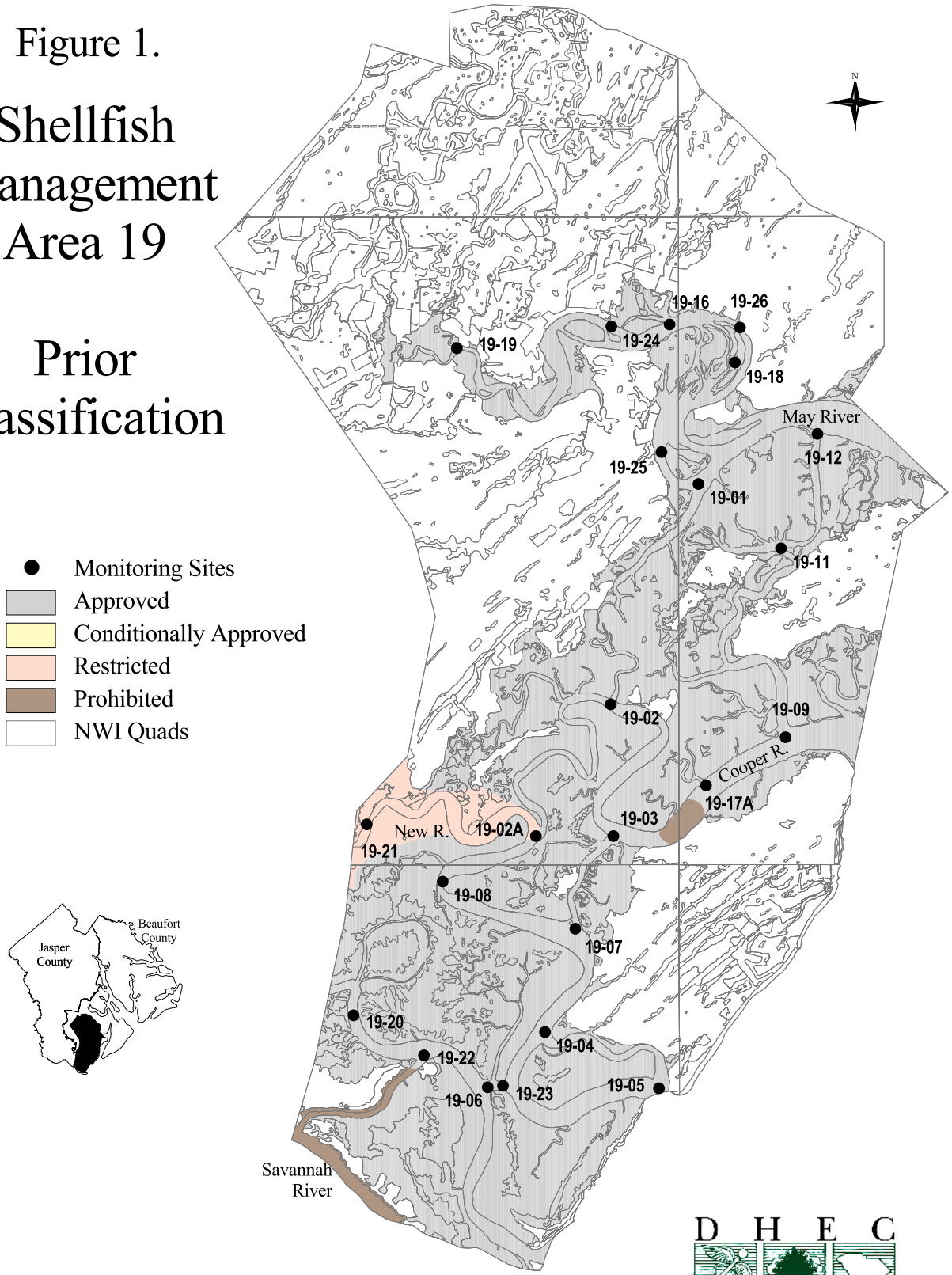
Station	Description
01	May River South of Palmetto Bluff, Marker #8
02	Unnamed Creek at Jack Crow Island in Cooper River
02a	Cooper River at New River
03	Ramshorn Creek at Cooper River
04	Cooper River at Marker #41 - Daufuskie Island
05	Bloody Point at Mungen Creek
06	Wright River, Marker #43
07	Ramshorn Creek at New River
08	First Creek on Left up New River at Pollution Line
09	Bull Creek at Cooper River
11	Bull Creek at Savage Creek
12	Bull Creek at May River
16	May River Behind Bluffton Oyster Co-op
17a	Cooper River Marina at Edge of CSZ
18	May River below Drainage Canals at Marker #11
19	May River at First Dock in Headwaters past Bluff
20	1.5 Miles up Wright River from Fields Cut
21	2.5 Miles up New River from Station 19-02a
22	Wright River at Fields Cut
23	New River at Walls Cut (**deactivated**)
24	May River at Southern end of Crane Island
25	May River at Green Marker #25
26	**May River, Southeast of Heyward Cove (New)**
27	**Wright River at confluence with Atlantic Ocean (New)**

(Total 23)

Figure 1.

Shellfish Management Area 19

Prior Classification



D H E C

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South Carolina Department of Health and Environmental Control

Figure 2.

Shellfish Management Area 19

Current Classification

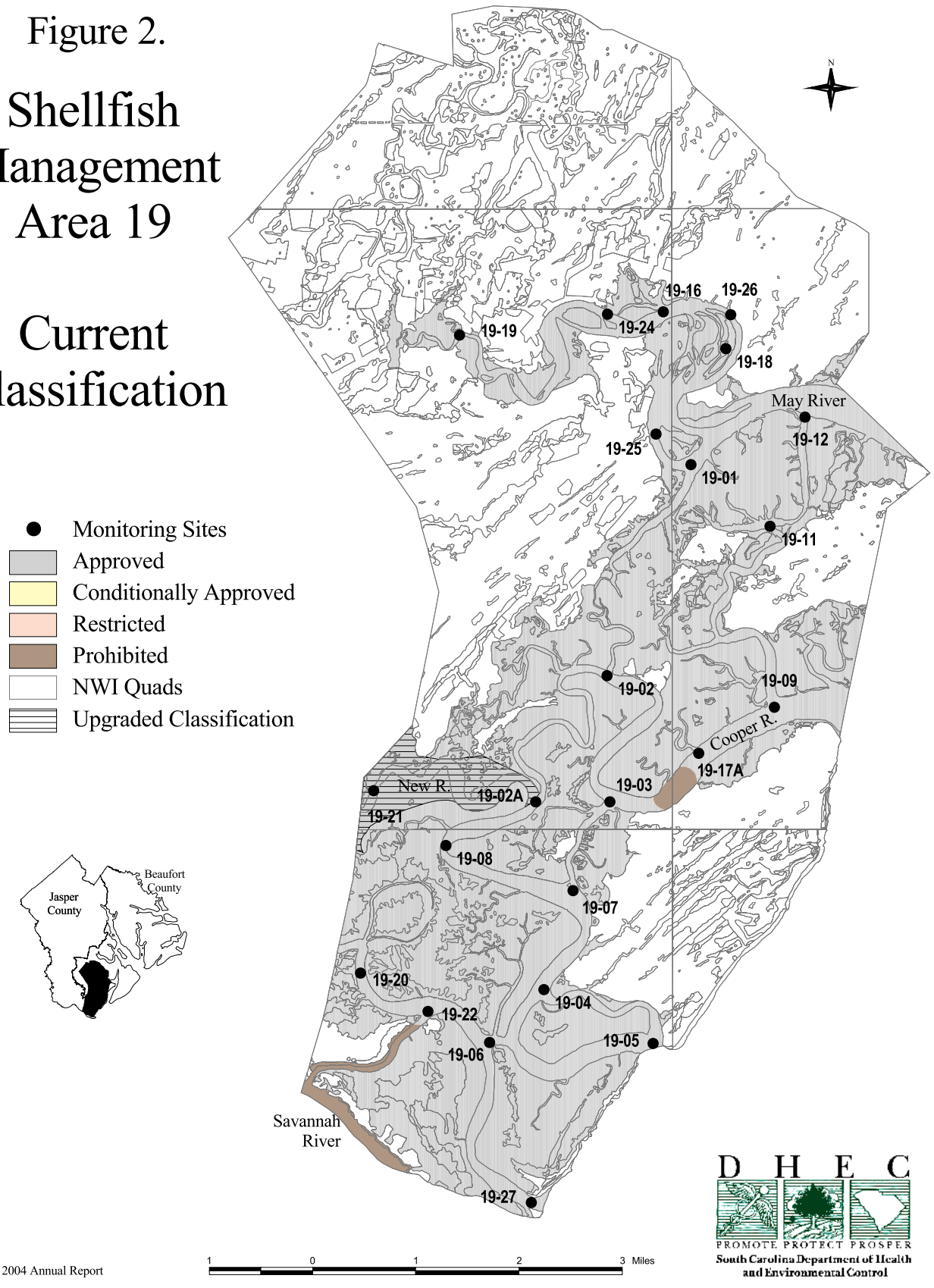

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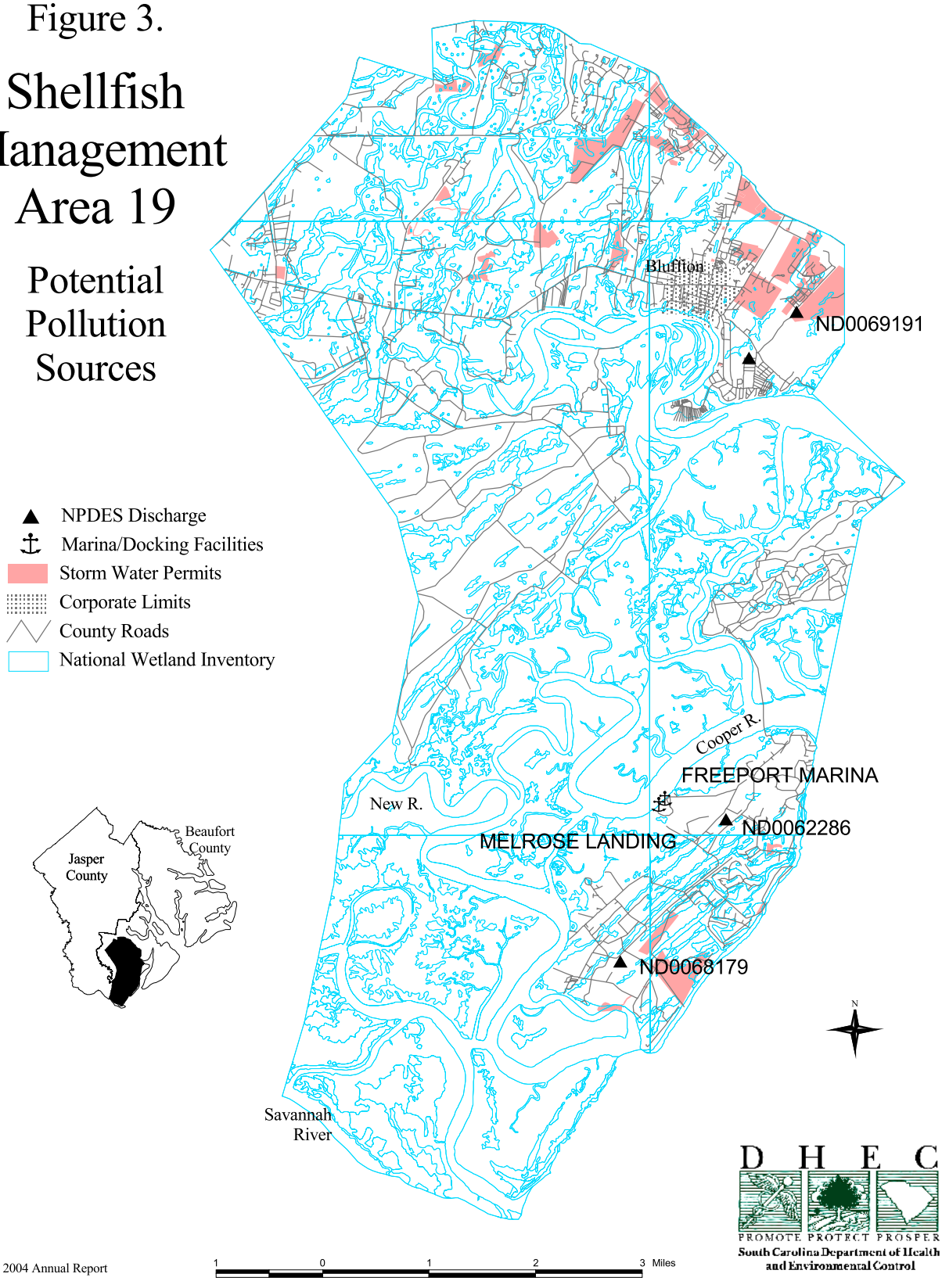
Figure 3.

Shellfish Management Area 19

Potential Pollution Sources



D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

TABLE #2
Shellfish Management Area 19
Fecal Coliform Bacteriological Data Summary
from Shellfish Water Quality Monitoring Stations between

January 1, 2001 and December 31, 2003

Station # ?	1	2	2A	3	4	5	6	7	8	9	11
SAMPLES	35	36	36	36	36	36	36	36	36	36	36
GEOMEAN	2.8	4.6	4.1	2.6	2.8	3.4	2.8	2.7	3.0	2.9	2.8
EST 90TH%ILE	5	15	11	4	6	7	6	5	6	6	6
WATER QLTY	A	A	A	A	A	A	A	A	A	A	A
CLASSIFICATION	A	A	A	A	A	A	A	A	A	A	A

Station # ?	12	16	17A	18	19	20	21	22	23	24	25
SAMPLES	36	36	36	36	36	36	36	36	36	36	35
GEOMEAN	2.5	3.3	2.8	4.2	3.8	3.1	4.2	3.6	2.8	3.5	3.3
EST 90TH%ILE	4	8	5	9	10	7	11	9	6	9	8
WATER QLTY	A	A	A	A	A	A	A	A	A	A	A
CLASSIFICATION	A	A	A	A	A	A	A	A	A	A	A

Station # ?											
SAMPLES											
GEOMEAN											
EST 90TH%ILE											
WATER QLTY											
CLASSIFICATION											

*New - Less than 30 samples

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** - Prohibited

TABLE #3

Water Quality
Monitoring Stations Data

Shellfish Management Area 19

BACTERIOLOGICAL DATA

Data for each shellfish station listed in this report's "Fecal Coliform Bacteriological Data Summary Table" and in other shellfish reports, can be obtained through South Carolina's Department of Health and Environmental Control - Freedom of Information office at the address below.

Freedom of Information
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.

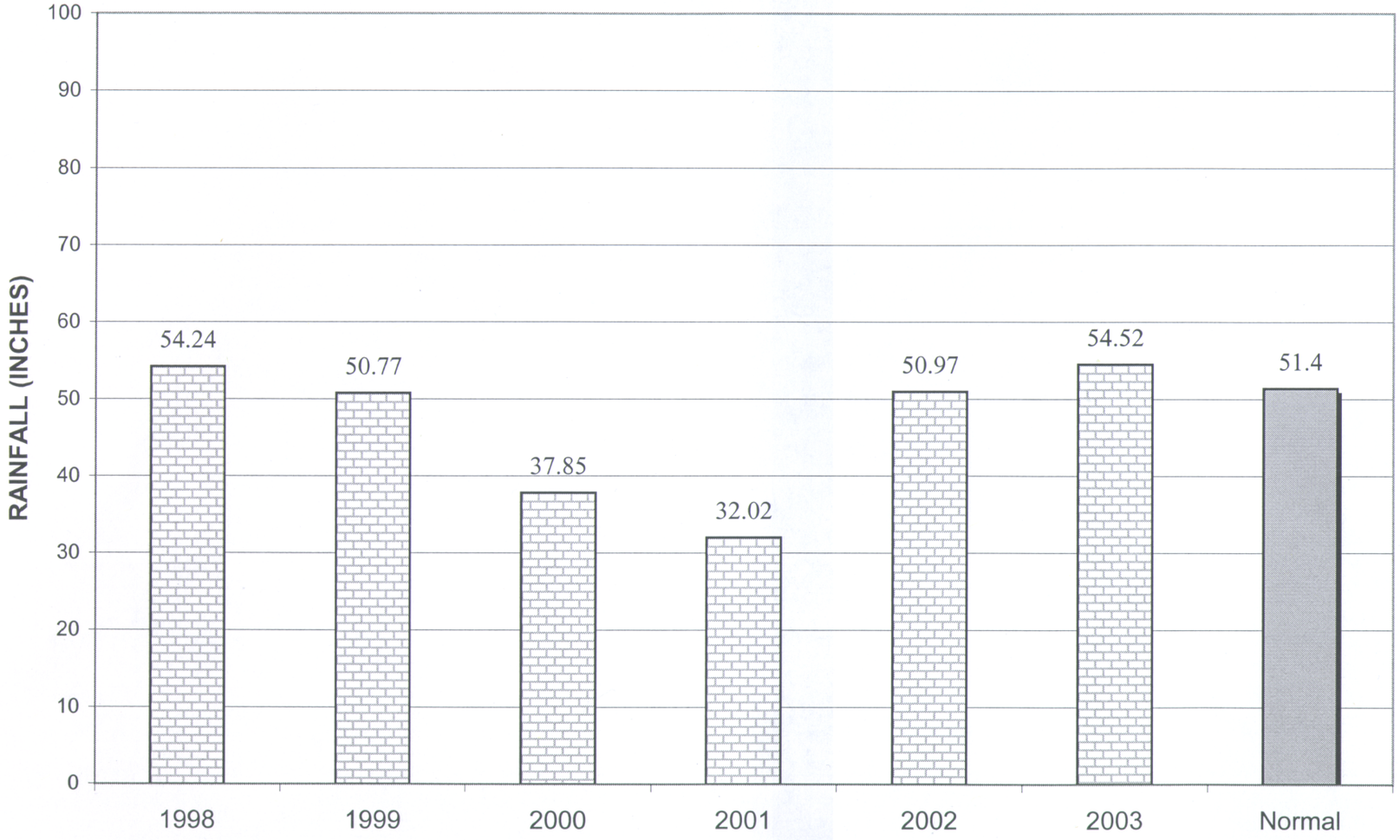
TABLE #4

Rainfall Data

Shellfish Management Area 19

Source:
NOAA/National Weather Service
National Climatic Data Center, Asheville, North Carolina 28801

BEAUFORT ANNUAL RAINFALL 1998-2003



ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: City of Beaufort Wastewater Treatment Plant

Beaufort, SC (Station #380559 / 7-SW)

2001	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	--	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.00	0.00	--	0.04	0.00	--	0.00	0.00	0.00
3rd	0.00	0.00	0.03	0.00	0.00	--	0.02	0.00	--	0.00	0.00	0.00
4th	0.00	0.18	0.85	0.04	0.00	0.41	0.42	0.00	0.75	0.00	0.00	0.00
5th	0.00	0.08	0.02	0.00	0.00	--	0.59	0.01	1.30	0.00	0.00	0.00
6th	0.00	0.00	0.00	0.00	0.00	--	0.00	0.10	0.13	0.00	0.00	0.00
7th	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.23	0.25	0.00	0.00
8th	0.02	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.23	0.00	0.00	0.00
9th	0.31	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.02	0.00	0.00	0.48
10th	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.05	0.00	--	0.00
11th	0.00	0.06	0.00	0.00	0.00	0.05	0.00	--	0.00	0.00	--	0.63
12th	0.10	0.70	0.00	0.00	0.00	1.30	0.00	0.00	0.05	0.02	0.00	0.06
13th	0.09	0.06	0.77	0.00	0.00	--	1.06	1.58	0.00	--	0.00	0.00
14th	0.00	0.02	0.00	0.20	0.00	0.20	0.28	0.66	0.00	--	0.00	0.00
15th	0.00	0.00	0.15	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	--
16th	0.00	0.00	0.80	0.20	0.00	--	0.00	0.00	0.00	0.00	0.00	--
17th	0.00	0.11	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	--	0.00
18th	0.03	0.00	0.00	0.00	0.00	0.04	0.00	2.37	0.00	0.00	--	0.07
19th	0.00	0.00	0.00	0.00	0.00	--	0.00	2.30	0.00	0.00	0.00	0.00
20th	0.45	0.00	1.05	0.00	0.00	0.22	0.00	0.45	0.00	--	0.00	0.00
21st	0.00	0.00	0.51	0.00	0.00	0.11	--	1.02	0.00	--	0.00	0.00
22nd	0.00	0.03	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00
23rd	0.00	0.35	0.00	0.00	0.05	0.04	0.03	0.00	--	0.00	--	0.00
24th	0.00	0.00	0.00	0.00	0.00	0.05	1.00	0.00	0.04	0.00	0.00	0.02
25th	0.00	0.00	0.01	0.00	0.00	--	1.10	0.00	0.90	0.00	0.03	0.00
26th	0.00	0.06	0.00	0.27	0.00	0.28	0.03	0.00	0.01	0.00	0.00	0.00
27th	0.00	0.00	0.00	0.00	0.00	0.28	0.08	0.00	0.00	0.00	0.00	0.00
28th	0.00	0.01	0.00	0.00	0.00	0.01	--	0.00	0.00	--	--	0.00
29th	0.00		0.21	0.00	0.00		--	0.00	0.00	0.00	0.00	0.00
30th	0.00		0.95	0.00	0.40		0.00	0.02	0.00	0.00	0.00	0.00
31st	0.80		0.03		0.00		0.00			0.00		0.00
(Monthly Figures)									**Year's Rainfall Total:**		**32.02**	
SUM	1.80	1.66	5.38	0.71	0.45	3.57	4.65	8.53	3.71	0.27	0.03	1.26
MAX	0.80	0.70	1.05	0.27	0.40	1.30	1.10	2.37	1.30	0.25	0.03	0.63
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.06	0.06	0.17	0.02	0.01	0.22	0.17	0.29	0.15	0.01	0.00	0.04

Note:"--" denotes missing data

(Shellfish Management Areas 14, 15, 16A, 16B, 17, 18, 19)

ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: City of Beaufort Wastewater Treatment Plant

Beaufort, SC (Station #380559 / 7-SW)

2002	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	2.60	0.00	0.00	--	0.81	0.65	0.05	0.00	0.00
2nd	0.10	0.00	--	0.00	0.00	0.00	0.00	0.02	0.06	0.15	0.00	0.00
3rd	0.50	--	--	0.00	0.00	0.00	0.00	--	0.16	0.00	0.00	0.00
4th	0.08	0.00	0.05	0.00	--	0.00	0.00	0.02	0.00	--	0.00	0.00
5th	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.25	0.00
6th	--	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.78	0.13
7th	0.00	1.01	0.00	0.00	0.00	0.00	--	0.49	0.00	0.02	0.04	--
8th	0.00	0.25	0.00	0.02	--	0.00	0.00	0.00	0.00	0.00	0.00	--
9th	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
10th	0.00	0.27	0.00	0.41	0.00	0.00	0.28	0.00	--	1.85	1.12	0.73
11th	0.00	0.15	0.00	0.04	0.00	0.00	0.00	0.00	0.00	--	0.00	0.35
12th	0.00	0.00	0.00	--	0.00	0.00	2.16	0.00	0.00	0.04	1.20	0.04
13th	--	0.00	0.35	0.00	0.00	0.00	--	0.00	--	0.04	0.89	0.56
14th	0.00	0.00	0.00	0.00	0.11	0.00	0.60	0.07	0.90	0.05	0.00	0.03
15th	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.02	0.00	0.00
16th	0.00	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17th	0.00	--	--	0.00	0.00	--	0.00	--	0.00	0.00	1.59	0.00
18th	0.00	0.00	0.03	0.00	0.00	0.02	0.00	0.25	0.22	0.00	0.03	0.00
19th	--	0.00	0.00	0.00	1.10	0.63	0.00	0.02	0.16	0.00	0.00	0.04
20th	--	0.00	0.00	0.00	0.00	3.85	--	0.00	0.11	0.00	0.00	0.20
21st	0.00	0.21	0.18	0.00	0.00	1.21	1.97	0.00	0.00	0.00	0.00	0.02
22nd	0.10	0.00	0.20	0.00	--	0.01	0.00	0.00	0.58	0.00	0.09	0.00
23rd	0.01	0.01	0.00	0.00	0.00	0.76	0.85	0.00	1.20	0.00	0.00	0.00
24th	0.00	0.04	--	0.00	0.00	0.92	0.01	0.04	0.00	0.09	0.00	0.08
25th	0.01	0.00	0.00	0.00	--	0.78	0.60	0.84	0.84	0.09	0.00	1.33
26th	0.14	0.00	0.00	--	0.00	0.01	0.00	0.30	0.51	0.00	0.00	0.00
27th	0.00	0.00	0.48	--	0.00	0.00	0.00	--	--	0.00	0.00	0.00
28th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	--	0.49	0.00	0.00
29th	0.00		0.00	0.00	0.00		0.00	2.23	2.05	0.38	0.00	0.00
30th	0.00		0.00		0.00		0.00	1.50		0.00	0.00	0.00
31st	0.00		--		0.00		0.00					0.00
(Monthly Figures)									**Year's Rainfall Total:**		**50.97**	
SUM	1.34	1.96	1.29	3.14	1.21	8.19	6.48	6.59	8.00	3.27	5.99	3.51
MAX	0.50	1.01	0.48	2.60	1.10	3.85	2.16	2.23	2.05	1.85	1.59	1.33
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.05	0.08	0.05	0.12	0.04	0.30	0.24	0.26	0.32	0.12	0.20	0.13

Note:"--" denotes missing data

(Shellfish Management Areas 14, 15, 16A, 16B, 17, 18, 19)

ANNUAL TABLE OF DAILY RAINFALL DATA

SOURCE: City of Beaufort Wastewater Treatment Plant

Beaufort, SC (Station #380559 / 7-SW)

2003	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.32	0.00	0.00	0.00	0.00	1.00	0.02	0.00	0.22	0.00	0.00	0.00
2nd	0.00	0.00	0.47	0.00	0.00	0.00	0.61	0.14	0.00	0.00	0.00	0.00
3rd	0.00	0.00	0.01	0.00	0.10	0.00	0.84	0.00	0.00	0.00	0.00	0.00
4th	0.00	0.02	0.33	0.00	0.03	0.86	0.00	0.00	0.03	0.00	0.06	0.47
5th	0.00	0.03	0.08	0.00	0.00	0.51	0.03	0.56	0.02	0.00	0.05	0.44
6th	0.00	0.00	0.02	0.03	0.00	0.00	0.01	0.00	2.10	0.00	0.00	0.00
7th	0.00	0.42	1.04	0.09	0.43	0.16	0.00	0.30	0.15	0.01	0.00	0.00
8th	0.00	0.03	0.55	0.96	0.00	0.70	0.05	0.00	0.27	0.02	0.00	0.00
9th	0.00	0.00	0.02	1.26	0.00	0.36	0.00	0.00	0.15	0.07	0.00	0.00
10th	0.00	0.12	0.01	0.72	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00
11th	0.00	0.31	0.00	0.15	0.00	0.00	0.00	0.02	0.00	0.02	0.00	--
12th	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13th	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.00
14th	0.00	0.00	0.56	0.00	0.00	0.66	0.11	0.00	0.00	0.00	0.00	0.33
15th	0.00	0.00	0.21	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00
16th	0.00	0.00	0.15	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17th	0.00	1.40	0.02	0.00	0.12	0.25	0.00	0.08	0.00	0.00	0.00	0.02
18th	0.00	0.05	0.38	0.00	1.92	0.26	0.00	0.36	0.00	0.07	0.00	0.00
19th	0.00	0.00	0.10	0.00	2.80	1.14	0.00	2.42	0.00	0.00	0.00	0.00
20th	0.00	0.00	0.11	0.00	0.00	0.00	3.95	0.00	0.00	0.00	0.36	0.00
21st	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00
22nd	0.03	0.02	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23rd	0.23	0.58	0.00	0.00	3.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00
24th	0.00	0.00	0.00	0.00	0.00	0.00	1.85	0.00	0.05	0.00	0.00	0.04
25th	0.00	0.00	0.00	0.00	0.04	0.00	1.29	0.16	0.00	0.00	0.00	0.00
26th	0.00	0.00	0.00	1.34	0.16	0.00	0.62	0.51	0.00	0.00	0.00	0.00
27th	0.00	0.45	0.00	0.46	0.11	0.00	0.20	0.03	0.00	0.00	0.00	0.00
28th	0.00	0.09	0.01	0.00	0.00	0.00	0.63	0.00	0.00	0.25	0.00	0.00
29th	0.00		0.00	0.00	0.00	1.00	0.36	0.00	0.00	2.60	0.21	0.00
30th	0.00		0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00
31st	0.00		0.30		0.00		0.00	0.00		0.00		0.00
(Monthly Figures)									**Year's Rainfall Total:**		**54.52**	
SUM	0.58	3.52	4.75	5.08	9.00	7.05	11.17	5.07	3.28	3.04	0.68	1.30
MAX	0.32	1.40	1.04	1.34	3.01	1.14	3.95	2.42	2.10	2.60	0.36	0.47
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.02	0.13	0.15	0.17	0.29	0.24	0.36	0.16	0.11	0.10	0.02	0.04

Note:"--" denotes missing data

(Shellfish Management Areas 14, 15, 16A, 16B, 17, 18, 19)

Shellfish Management Area 19

A SUMMARY OF RAINFALL

DURING AND PRIOR TO FECAL COLIFORM MONITORING

Sample Date	Sample Date + 24 hours	Sample Date	Sample Date - 24 hours	Sample Date - 48 hours	Sample Date - 72 hours
01/16/01	0.00"	0.00"	0.00"	0.00"	0.09"
02/07/01	0.00"	0.00"	0.00"	0.08"	0.18"
03/27/01	0.00"	0.00"	0.00"	0.01"	0.00"
04/10/01	0.00"	0.00"	0.00"	0.00"	0.00"
05/14/01	0.00"	0.00"	0.00"	0.00"	0.00"
06/04/01	no data	0.41"	no data	no data	no data
07/23/01	1.00"	0.03"	no data	no data	0.00"
08/15/01	0.00"	0.66"	1.58"	0.00"	no data
09/19/01	0.00"	0.00"	0.00"	0.00"	0.00"
10/29/01	0.00"	0.00"	no data	0.00"	0.00"
11/26/01	0.00"	0.00"	0.03"	0.00"	no data
12/05/01	0.00"	0.00"	0.00"	0.00"	0.00"
01/15/02	0.00”	0.40”	0.00”	no data	0.00”
02/12/02	0.00”	0.00”	0.15”	0.27”	0.00”
03/19/02	0.00”	0.00”	0.03”	no data	no data
04/03/02	0.00”	0.00”	0.00”	2.60”	no data
05/29/02	0.00"	0.00"	0.00"	0.00"	0.00"
06/25/02	0.92”	0.76”	0.01”	1.21”	3.85”
07/16/02	0.00”	0.00”	0.00”	0.60”	no data
08/07/02	0.00”	0.49”	0.00”	no data	0.02”
09/23/02	1.20”	0.58”	0.00”	0.11”	0.16”
10/09/02	0.00”	0.00”	0.02”	0.00”	no data
11/20/02	0.00”	0.00”	0.00”	0.03”	1.59”
12/09/02	0.73”	no data	no data	no data	0.13”
01/22/03	0.23”	0.03”	0.00”	0.00”	0.00”
02/25/03	0.00”	0.00”	0.00”	0.58”	0.02”
03/12/03	0.00”	0.00”	0.00”	0.01”	0.02”
04/21/03	0.07”	0.00"	0.00"	0.00"	0.00"
05/14/03	0.00”	0.00”	0.00”	0.08”	0.00”
06/16/03	0.25”	0.00”	0.00”	0.66”	0.00”
07/07/03	0.05”	0.00”	0.01”	0.03”	0.00”
08/19/03	0.00”	2.42”	0.36”	0.08”	0.00”
09/03/03	0.03”	0.00”	0.00”	0.22”	0.00”
10/22/03	0.00"	0.00"	0.00"	0.00"	0.00"
11/17/03	0.00"	0.00"	0.00"	0.00"	0.00"
12/02/03	0.00"	0.00"	0.00"	0.00"	0.21”

[Amounts Shown Are per Day, not Cumulative] / Station 380559-Beaufort 7 SW